

**WHAT IS CLAIMED IS:**

1. A method for sintering a gel tube formed by a sol-gel process,  
wherein the gel tube is sintered under a vacuum condition while being rotated and  
vertically moved so as to increase a diffusion speed of gas remaining in the gel tube.

- 5           2. An apparatus for sintering a gel tube formed by a sol-gel change, comprising:  
a reaction chamber for housing the gel tube under a sealed vacuum condition;  
a vacuum pump for adjusting the vacuum condition inside the reaction chamber  
according to a control signal;  
a vacuum gauge for measuring the vacuum condition inside the reaction chamber;  
10           a movable part for supporting the gel tube and for rotating and vertically moving the  
gel tube according to the control signal;  
a temperature sensor for measuring temperature inside the reaction chamber;  
a heater for adjusting the temperature inside the reaction chamber according to the  
control signal to sinter the gel tube; and,  
15           a controller for controlling the vacuum pump, the heater, and the movable part to  
sinter the gel tube under the vacuum condition.

3. The apparatus of Claim 2, further comprising a valve for selectively  
introducing air into the reaction chamber.

4. The apparatus of Claim 2, further comprising a pipe coupled between the reaction chamber and the vacuum pump.

5 5. An apparatus for sintering a gel tube formed by a sol-gel change, comprising:  
a reaction chamber for accommodating the gel tube under a sealed vacuum condition;

a first vacuum pump for adjusting the vacuum condition inside the reaction chamber according to a control signal;

10 a vacuum gauge for measuring the vacuum condition inside the reaction chamber;

a temperature sensor for measuring temperature inside the reaction chamber;

a heater for adjusting the temperature inside the reaction chamber according to the control signal so as to sinter the gel tube;

a heating chamber for housing the reaction chamber and for supporting the heater,

15 which is sealed under a vacuum condition independent of the reaction chamber;

a second vacuum pump for adjusting the vacuum condition inside the heating chamber according to the control signal; and,

a controller for controlling the first and second vacuum pumps and the heater so as to sinter the gel tube under the vacuum condition and prevent a deformation of the heating  
20 chamber.

6. The apparatus of Claim 5, further comprising a movable part for rotating and vertically moving the gel tube according to the control signal, wherein the controller controls the movable part so that the gel tube rotates and moves vertically while being sintered.

5        7. The apparatus of Claim 5, wherein the reaction chamber is made of quartz so as to minimize gas generated during the sintering of the gel tube under the vacuum condition.

8. An apparatus for sintering a gel tube formed by a sol-gel change, comprising:  
a reaction chamber for housing the gel tube under a sealed vacuum condition;  
a vacuum pump for adjusting the vacuum condition inside the reaction chamber

10 according to a control signal;

a vacuum gauge for measuring the vacuum condition inside the reaction chamber;  
a movable part for rotating and vertically moving the gel tube according to the control signal;

a bellows, disposed on the upper surface of the reaction chamber, for absorbing an  
15 impact due to a pressure change inside the reaction chamber;

a temperature sensor for measuring temperature inside the reaction chamber;

a heater for adjusting the temperature inside the reaction chamber according to the control signal to sinter the gel tube; and,

a controller for controlling the vacuum pump, the heater, and the movable part to

sinter the gel tube under the vacuum condition.

9. The apparatus of Claim 8, wherein the bellows comprises a plurality of rings continuously connected to each other.